William J. Heuett

LBM/NIDDK/NIH
Building 12A, Room 4007
12 South Drive MSC 5621
Bethesda, MD 20892-5621

(301) 496–1897 (office)
(301) 402–0535 (fax)
heuettw@niddk.nih.gov
lbm.niddk.nih.gov/heuettw

RESEARCH INTRESTS

Mathematical biology, computational systems biology, and molecular biophysics: using nonlinear optimization and deterministic and stochastic models to investigate the dynamics and regulation of metabolic networks and signaling pathways in living cells.

EMPLOYMENT

IRTA Postdoctoral Fellow, Laboratory of Biological Modeling, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, June 2007 – present. Supervisor: Vipul Periwal

Lecturer, University of Colorado, Boulder, Applied Mathematics, August 2006 – May 2007.

Research Associate, University of Colorado, Boulder, Physics, January 2006 – December 2006.

EDUCATION

PhD **University of Washington**, **Seattle**, Applied Mathematics, December 2005.
Dissertation: *New Methods for Modeling Large-Scale Biochemical Networks*.
Advisor: Hong Qian

MS **University of Washington**, **Seattle**, Applied Mathematics, June 2002.

BS **University of Colorado**, **Boulder**, Applied Mathematics, May 2000.

HONORS AND AWARDS

National Institutes of Health Intramural Research Training Award (IRTA) Fellow, June 2007 – present.

National Science Foundation Grant for Vertical Integration of Research and Education in the Mathematical Sciences (VIGRE) Fellow, September 2004 – December 2005 & September 2000 – August 2001.

Department of Defense National Defense Science and Engineering Graduate (NDSEG) Fellow, September 2001 – August 2004. One of approximately 150 awarded annually.

Boeing Award for Excellence in Graduate Studies, UW Seattle, 2002 & 2000. One of three awarded annually to graduate students in the Department of Applied Mathematics.

Departmental award for highest GPA in graduating class, CU Boulder, 2000. Awarded annually to one student in the Department of Applied Mathematics.

Academic Support Tutor of the Year, CU Boulder, 1999. One of two awarded campus-wide by CU's Academic Support Assistance Program.

Dean's List, CU Boulder, August 1996 – May 2000. College of Engineering and Applied Science.

Scholarships: McClellan (August 1996 – June 1998), Nordeen Engineering (August 1996 – June 1998), Norwest Foundation (August 1996 – June 1997), Sam Walton Memorial (August 1996 – June 1997), and Ruth Robinson (August 1996 – June 1997).

PROFESSIONAL ACTIVITIES

Journal Referee, *BioSystems*, *Biophysical Chemistry*, *International Federation of Automatic Control*, *Journal of Chemical Physics*, and *Physical Chemistry Chemical Physics*.

Mentor, SciMentorNet, NIH-sponsored e-mentoring program, Winter 2008 – present.

Assistant Webmaster and Digest Editor, Society for Mathematical Biology, Winter 2008 – present.

VIGRE Professional Development Forum Committee Member, University of Washington,

Seattle, Autumn 2004 – Autumn 2005.

VIGRE Undergraduate Mathematical Sciences Seminar Committee Member, University of Washington, Seattle, Autumn 2004 – Autumn 2005.

Editorial Assistant, *Journal of the Atmospheric Sciences,* Spring 2003.

Graduate Student Representative to the Faculty, Department of Applied Mathematics, University of Washington, Seattle, Autumn 2001 – Summer 2002.

Lead Teaching Assistant, Department of Applied Mathematics, University of Washington, Seattle, Autumn 2001 – Summer 2002.

Mentor to incoming graduate students, Department of Applied Mathematics, University of Washington, Seattle, Autumn 2001 – Spring 2005.

Vice President, University of Colorado Chapter, Society for Industrial and Applied Mathematics, Autumn 1999 – Spring 2000.

PROFESSIONAL AFFILIATIONS

American Mathematical Society (AMS)
American Society for Engineering Education (ASEE)
European Society for Mathematical and Theoretical Biology (ESMTB)
Golden Key National Honor Society
New York Academy of Sciences (NYAS)
Society for Mathematical Biology (SMB)
Society for Industrial and Applied Mathematics (SIAM)
Tau Beta Pi Engineering Honor Society

PUBLICATIONS

Journal Publications:

WJ Heuett and V Periwal. Non-ohmic proton leak due to uncoupling protein activation by reactive oxygen species. *American Journal of Physiology – Endocrinology and Metabolism*. Submitted.

WJ Heuett, DA Beard, and H Qian. Linear analysis near a steady-state of biochemical networks: control analysis, correlation metrics and circuit theory. *BMC Systems Biology*, **2**:44 (2008).

WJ Heuett and H Qian. Combining flux and energy balance analysis to model large-scale biochemical networks. *Journal of Bioinformatics and Computational Biology*, **4**:1227–1243 (2006).

WJ Heuett and H Qian. A stochastic model of oscillatory blood testosterone levels. *Bulletin of Mathematical Biology*, **68**:1383–1399 (2006).

WJ Heuett and H Qian. Grand canonical Markov model: a stochastic theory for nonequilibrium biochemical networks. *Journal of Chemical Physics*, **124**:044110 (2006).

Book Reviews:

Chemical Biophysics: Qualitative Analysis of Cellular Systems, by D. A. Beard and H. Qian. *SIAM Review*. Submitted.

Knowledge Discovery in Proteomics, by I. Jurisica and D. Wigle. *SIAM Review*, **49**:347–348 (2007).

TEACHING EXPERIENCE

University of Colorado, Boulder:

Lecturer, *Undergraduate & Graduate Statistical Methods,* Autumn 2006 & Spring 2007. Solely responsible for course syllabus, lectures, and grading. Course covered discrete and continuous probability, introduced statistical methods for hypothesis testing, and emphasized applications with an introduction to packaged computer programs.

Lecturer, *Differential Equations and Linear Algebra,* Spring 2007. Responsible for course syllabus, lectures, and grading. Topics covered included qualitative methods, linear and nonlinear ODEs, and first and second order systems.

Tutor, Academic Support Assistance Program, Autumn 1998 – Spring 1999.
Explained principles and answered questions for small groups of one to six students taking *Calculus I, II, III, Ordinary Differential Equations,* and *Astronomy*.

Grader, *Calculus I* and *II,* Spring 1999 – Spring 2000.
Responsible for grading homework assignments for undergraduate courses.

Computer Lab Assistant, Applied Mathematics Computer Lab, Spring 1999.
Helped students find solutions to homework and computing problems.

Lead Teaching Assistant, *Introduction to Computing,* Autumn 1997 – Spring 1998.
Revised curriculum and created computer lab assignments to introduce students to Microsoft Excel, Matlab, and FORTRAN. Held office hours in computer lab.

University of Washington, Seattle:

Instructor, *Continuous Mathematical Modeling,* Autumn 2004 & Summer 2003.
Solely responsible for course syllabus, lectures, and grading. Course covered methods for modeling dynamics of populations, physical systems, and traffic flow.

Teaching Assistant, *Graduate Level Complex Variables*, Autumn 2002.
Graduate Level Ordinary Differential Equations, Winter 2002.
Calculus I, Autumn 2000.
Graded assignments and exams, lectured in recitation sections, and communicated with instructors regarding subject matter for which students needed more explanation.

PRESENTATIONS AND MEETINGS

2008

Poster presentation, *A model of mitochondrial reactive oxygen species production*, 21st NIH Research Festival, Bethesda, MD, October 2008.

Poster presentation, *A model of mitochondrial reactive oxygen species production*, Mitochondrial Biology in Cardiovascular Health and Diseases Conference, Bethesda, MD, October 2008.

Poster presentation, *A model of mitochondrial reactive oxygen species production*, 2008 Mid-Atlantic Diabetes Research Symposium, Bethesda, MD, October 2008.

Poster presentation, *A model of mitochondrial reactive oxygen species production*, Mathematical Modeling of Human Metabolism and Body Weight Regulation, Bethesda, MD, September 2008.

Poster presentation, *The integrative physiology of mitochondria*, New York Academy of Sciences: Integrative Physiology meeting, New York, NY, May 2008.

Participant, Mitochondrial Molecular Biology and Pathology Workshop, Bethesda, MD, May 2008.

Participant, Diabetes Genes and Beta Cell Function Conference, Bethesda, MD, April 2008.
Sciences: Integrative Physiology meeting, New York, NY, May 2008.

Speaker, *A model of ATP and ROS production in pancreatic beta-cell mitochondria*, National Institute of Diabetes and Digestive and Kidney Diseases Data Club Meeting, Bethesda, MD, March 2008.

Poster presentation, *Effects of free radicals in mitochondria*, Keystone Symposia: Diabetes Mellitus, Insulin Action and Resistance, Breckenridge, CO, January 2008.

Poster presentation, *Effects of free radicals in mitochondria*, 3rd NIH International Mitochondria Minisymposium, Bethesda, MD, January 2008.

2007

Participant, New York Academy of Sciences: Mitochondria and Oxidative Stress in Neurodegenerative Disorders Conference, New York, NY, September 2007.

Poster presentation, *A model of reactive oxygen species' effects in mitochondria*, 20th NIH Research Festival, Bethesda, MD, September 2007.

2006

Symposium speaker, *Constraints-based optimization methods for modeling metabolism in cancer: the Warburg effect revisited*, SIAM Annual Meeting: Disease Mechanisms in the

Human Body Minisymposium, Boston, MA, July 2006.

Poster presentation, *A stochastic model of oscillating testosterone levels in men*, Institute for Pure and Applied Mathematics Systems: Biology and Molecular Modeling Workshop, University of California, Los Angeles, CA, May 2006.

Invited speaker, *A stochastic model of pulsatile blood testosterone levels*, Applied Math Dynamical Systems Seminar, University of Colorado, Boulder, CO, March 2006.

Poster presentation, *Combining flux and energy balance analysis to model genome-scale biochemical networks*, Mathematical Biosciences Institute: 2nd Young Researchers Mathematical Biology Workshop, Ohio State University, Columbus, OH, March 2006.

Invited speaker, *Constraints-based optimization methods for modeling large-scale biochemical networks*, Bioinformatics Super Group Meeting, University of Colorado, Boulder, CO, February 2006.

2005

Speaker, *Boundary driven open Markov system: a new mathematical framework for nonequilibrium biochemical networks*, European Conference on Mathematical and Theoretical Biology, Dresden, Germany, July 2005.

Colloquium speaker, *A stochastic model of pulsatile blood testosterone levels*, Mathematics and Computer Science, University of Puget Sound, Tacoma, WA, February 2005.

2004

Speaker, *On planning a career in mathematical biology*, Undergraduate Mathematical Sciences Seminar Series, University of Washington, Seattle, WA, October 2004.

Invited speaker, *Systems biology and metabolism: kinetics, flux and energy balance, and thermodynamics*, Mathematical Biology Seminar, University of Colorado, Boulder, CO, September 2004.

Participant, Pacific Institute for the Mathematical Sciences: Dynamics, Control, and Computation in Biochemical Networks Workshop, Banff, Canada, August 2004.

2003

Participant, Red Raider Minisymposium on Mathematical Biology, Texas Tech University, Lubbock, TX, November 2003.

Invited speaker, *Large-scale reaction network analysis*, Applied and Computational Mathematical Sciences Seminar Series, University of Washington, Seattle, WA, October 2003.

Invited speaker, *Stoichiometric constraints-based modeling of large-scale biochemical networks*, Mathematical Biology Seminar Series, University of Washington, Seattle, WA, March 2003.